6. Isamu

Program Name: Isamu.java **Input File: isamu.dat**

Isamu just got the latest edition of *Pouch Monsters* and cannot wait to go adventuring! In *Pouch Monsters*, you build a team of the title creatures and visit all the cities in a region (the specific region changes between games). Each city in a region has a dojo, and beating the game requires defeating every dojo.

To travel between cities, Isamu uses the routes in the game. Each route connects two cities, and can be travelled in either direction. Isamu can use each route multiple times, and can also visit the same city multiple times. The only restriction is that he must visit each city at least once. Given the layout of cities and routes in the game, what is the minimum amount of distance Isamu needs to travel to beat the game?

Input:
The first line of input is a positive integer T (T <= 20), the number of test cases. The first line of each test case has two integers C (1 <= C <= 8) and R (C - 1 <= R <= 28), the number of cities and the number of routes. The next line has C space separated names, the name of each city. Isamu begins his adventure in the first city listed. The next R lines each have two cities and a distance. The distance between any two cities is at most 100 units. Routes can be taken in either direction, and there is at most one direct route between any pair of cities. It is always possible to travel from one city to another using the given routes.

Each city name is a string of at most 15 lowercase English letters.

Output:
For each test case, output the minimum distance Isamu must travel to visit every city, formatted as shown in sample ouput.

Sample Input and Output on next page…

Sample Input:

```
3
3 2
alpha beta gamma
alpha gamma 7
gamma beta 4
4 4
austin elpaso houston dallas
austin houston 3
dallas houston 5
dallas austin 4
austin elpaso 9
5 8
green brown blue yellow saffron
green brown 52
blue yellow 26
saffron brown 19
yellow saffron 12
green blue 21
saffron green 36
yellow brown 56
blue brown 66
```

Sample Output:

```
Case #1: 11
Case #2: 21
Case #3: 78
```

Sample Explanation:

In the first sample test case, Isamu can travel from `alpha` to `gamma` to `beta`, using the only routes available for a total cost of 11.

In the second sample test case, one possible optimal route is `austin`, `houston`, `dallas`, `austin`, `elpaso`.